ABSTRACT:

A dynamic overmodulation strategy for fast dynamic torque control in direct torque control (DTC)-hysteresis-based induction machine is proposed. The fastest dynamic torque response with a six-step mode can be achieved in the proposed method by switching only the most optimized voltage vector that produces the largest tangential component to the circular flux locus. This paper also discusses the performance of dynamic torque control in basic DTC in order to justify on how the proposed selected voltage vector results in excellent dynamic torque performance. The main benefit of the proposed method is its simplicity, since it only requires a minor modification to the conventional DTC-hysteresis-based structure and does not require a space vector modulator. To verify the feasibility of the proposed dynamic overmodulation strategy, simulation and experimentation, as well as comparison with the conventional DTC scheme, are carried out. Results showed a significant improvement in the dynamic torque response when compared to the conventional DTC-hysteresis-based method.